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PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Electrical Machines

We, COMPAGNIE ELECTRO-MECHANIQUE, a French Body Corporate, of 12, Rue Portalis, Paris 8 eme, France do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

The present invention relates to electrical machines and to methods of making electrical machines.

In the winding of an electrical machine, it is often necessary to interconnect some conductors to place the windings in coils or series or parallel with one another and to connect the winding to the machine terminals. To this end, connecting conductors between the various windings are used; the connecting conductors are not very firmly secured to the winding and must be kept grouped together and against the windings, as a rule by appropriate ties or straps or the like.

Thus, taking as an example the winding of a stator of a three-phase asynchronous motor, the following manual operations must be performed consecutively:

Winding of the coils on formers;

Placing the windings in slots of the magnetic circuit, which has been insulated beforehand;

Insulation of the ends of the consecutive coils belonging to different phases, this step being performed by the interposition, between the ends of the coils to be insulated, of flexible insulants of appropriate shapes and known as between-phase insulants;

Connection of the various coils to one another and to the machine terminals to provide the required three-phase winding;

Attachment of the connecting conductors to one another and to the ends of the coils by straps or ties engaged at the required places by means of a kind of lacing action;

As a rule, varnishing of the assembly thus wound with an appropriate resin, one function of which is to provide a satisfactory cohesion of the conductors which have been regrouped by the ties used for attachment.

During these operations, when the step of attaching the connecting conductors is carried out the ties which must be made between the ends of the magnetic circuit and the between-phases insulants tend to shift the latter, with the result of insulation faults. Also, to engage the ties or straps a lacing needle must be used, with the risk of damage to the insulant of the winding wires. This operation takes a long time to carry out and is only a secondary operation, for all that is being done is to regroup some conductors which will subsequently be potted with a resin. The same difficulties arise even in mechanised coil winding (placing of wire in the slots of the circuits by means of an automatic machine) since connections still have to be made between the windings and/or the coils.

According to one aspect of the invention, there is provided a method of making an electrical machine having a winding inserted in the slots of a stator, said winding being formed by coils connected at their ends to each other or to terminals of the machine by connecting wires, comprising the step of positioning an insulating member on the stator so that said member holds together in a desired position the connecting wires and the portions of the conductors forming the ends of the coils.

According to another aspect of the invention, there is provided an electrical machine having a winding inserted in the slots of a stator, said winding being formed by coils

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connected at their ends to each other or to terminals of the machine by connecting wires, an insulating member mounted on the stator holding together in a desired position the connecting wires and the portions of the conductors forming the ends of the coils.

The invention will be described by way of example with reference to the accompanying drawings, wherein:

Figure 1 is an isometric view of the stator, partly wound, of a small asynchronous rotary electric motor;

Figure 2 is a part longitudinal section through the stator, showing a tie holding connecting wires against one end of a coil in the manner described above;

Figure 3 is a similar section to Figure 2, but showing by way of contrast an insulating member holding connecting wires against one end of a coil in accordance with the invention, and

Figure 4 is a perspective view of the insulating member.

The stator of a small asynchronous motor is shown in Figure 1 partly wound. The various coils, such as 1, 2, after having been placed in slots in the magnetic circuit and after an insulating foil 3 has been inserted between the ends of these two coils, are in the positions shown.

The two ends 4, 5 of the coils 1, 2 placed one above another with the interposition of the insulating foil 3 are shown in Figure 2. Connecting wires 8 are clamped to the ends of the coils by ties or straps or the like 7, in the manner described above.

The disadvantage in using this attachment to secure the connections is very obvious, for the strap or the like 7 tends to shift the insulating foil 3. Also, as well as being awkward, it is dangerous for the insulation of the winding wires to thread the straps by means of a needle.

By contrast, in the embodiment of the invention shown in Figure 3, the connecting wires 8 are retained in position by an insulating member 9 which is shown in perspective in Figure 4. The member 9, which can with advantage be obtained by the moulding of a plastics material, is secured in place, for example, as shown, by an appropriate clamping, being fitted into the stator behind the ends of the coils, so that it is maintained in position by a small pressure of the ends of the coils, which position is such that retaining fingers 10 of the member 9 bear against said connecting wires 8 and the coil conductors.

A member such as the member 9 can be positioned very rapidly and without endangering the winding. It can stay in the machine permanently or, if required, be removed after polymerisation of the potting resin, so that the ends of the coils and the various connecting wires are held in position solely by said resin.

This feature is of use in all cases in which it is required to retain conductors on windings or coils in d.c. or a.c. static and rotating electrical machines. Clearly, therefore, the retaining member may be shaped differently from what has been described in the foregoing, but the retaining member is always a member bearing on a stationary part of the machine and having appropriately shaped fingers which contain the winding ends by pressing the conductors against one another.

WHAT WE CLAIM IS:—

1. A method of making an electrical machine having a winding inserted in the slots of a stator, said winding being formed by coils connected at their ends to each other or to terminals of the machine by connecting wires, comprising the step of positioning an insulating member on the stator so that said member holds together in a desired position the connecting wires and the portions of the conductors forming the ends of the coils.

2. A method according to claim 1, wherein the insulating member has fingers which are made to bear against the connecting wires to hold them in contact with the ends of the coils.

3. A method according to claim 1 or 2, wherein the insulating member is substantially annular and is positioned axially on the stator.

4. A method according to claim 1, 2 or 3, wherein the insulating member is placed between the stator and the ends of the coils and is made to hold connecting wires against parts of the ends of the coils which are insulated from parts of other coil ends by insulating material, the insulating member being caused to engage said connecting wires while being supported by the stator, engagement of the insulating material with the insulating member, such as would disturb the insulating material, being avoided.

5. A method according to any preceding claim, wherein resin is applied to the conductors and connecting wires after the insulating member has been so positioned.

6. A method according to Claim 5, wherein the insulating member is removed after the resin has been applied.

7. A method according to any one of claims 1 to 5, wherein the insulating member is retained in position to form part of the machine.

8. Methods of making electrical rotary machines substantially as herein described with reference to Figures 1, 3 and 4 of the accompanying drawings.

9. An electrical machine made by a method according to any preceding claim.

10. An electrical machine having a winding inserted in the slots of a stator, said winding being formed by coils connected at their

ends to each other or to terminals of the machine by connecting wires, an insulating member mounted on the stator holding together in a desired position the connecting wires and the portions of the conductors forming the ends of the coils.

11. A machine according to claim 10, wherein the insulating member has fingers bearing against the connecting wires and holding them in contact with the ends of the coils.

12. A machine according to claim 10 or 11, wherein the insulating member is substantially annular and is mounted axially on the stator.

13. A machine according to claim 10, 11 or 12, wherein the insulating member is disposed between the stator and the ends of the coils and holds connecting wires against parts of the ends of the coils which are insulated from parts of other coil ends by insulating material, the insulating member engaging the said connecting wires but not the insulating material and being supported by the stator.

14. A machine according to any one of claims 10 to 13, wherein resin has been applied to the conductors and connecting wires.

15. A machine according to claim 14, wherein the ends of the coils and the various connecting wires are held in position solely by said resin.

16. An electrical machine substantially as herein described with reference to and as illustrated in Figures 1, 3 and 4 of the accompanying drawings.

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2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

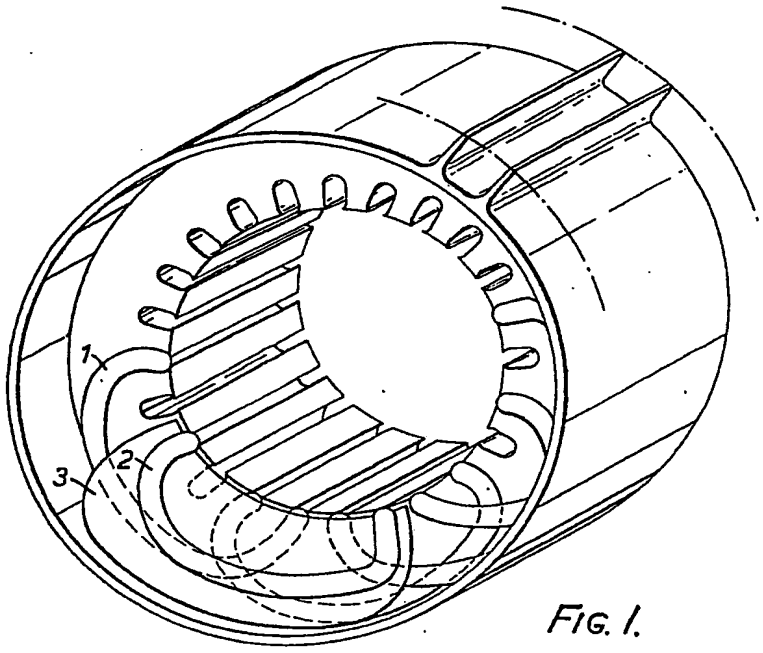


FIG. 1.

FIG. 3.

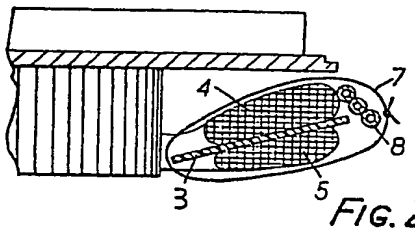
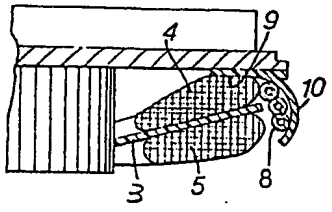


FIG. 2.



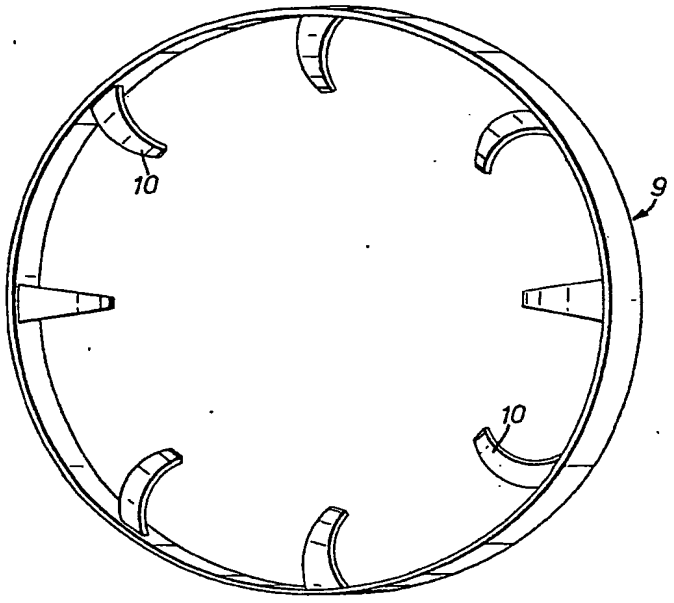


FIG. 4.